UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,540	04/26/2001	Frank Kowalewki	1587	9344

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EXAMINER
DEAN, RAYMOND S

ART UNIT	PAPER NUMBER
2684	

DATE MAILED: 07/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	**Applicant(s)**
Office Action Summary	09/830,540	KOWALEWKI, FRANK
	Examiner	**Art Unit**
	Raymond S Dean	2684

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14 - 30* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14 - 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3</u>.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____ .

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments, see Amendment filed April 22, 2004 with respect to the rejection(s)of claim(s) 1 – 3, 9, 10, and 12 under 35 U.S.C. 103 (a) as unpatentable over Zhuang et al. in view of Herzberg, 4 – 8 and 11 – 13 under 35 U.S.C. 103(a) as unpatentable over Zhaung et al. in view of Herzberg and in further view of Huang et al. have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of an updated search.

Drawings

2.   The drawings were received on April 22, 2004 These drawings are objected to because the lines, numbers, and letters are not well defined (See form PTO-948).

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4.   Claims 21 – 23, 29, and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Antonio et al. (US 6,519,456 B2).

Regarding Claim 21, Antonio teaches a radio station (1) comprising means for transmitting a pre-equalized signal to a receiving radio station (2) (Figure 5, Column 12 lines 13 – 17); means for performing an estimate of a total impulse response of plural radio channels (20,25) used for signal transmission to said receiving radio station (2) (Column 5 lines 5 – 7, Column 12 lines 13 – 17, since this is a CDMA system there will be multiple radio channels); and a modulator (4) comprising means for pre-equalization of propagated signals transmitted to said receiving radio station (2) and wherein said means for pre-equalization performs said pre-equalization according to said estimate of said total impulse response.(Figure 6, Column 12 lines 13 – 17, the modulator (114) comprises an IIR filter for pre-equalization).

Regarding Claim 22, Antonio teaches a method for transmitting signals between a first radio station (1) and a second radio station (2), in which a pre-equalization of signals to be transmitted is performed in a modulator (4) of said first radio station and resulting pre equalized signals are transmitted over radio channels (20,25) from the first radio station (1) to the second radio station (2) (Figure 1, Figure 5, Figure 6,Column 5 lines 5 – 7, Column 12 lines 13 – 17, the modulator (114) comprises an IIR filter for pre-equalization, since this is a CDMA system there will inherently be a plurality of radio channels with each radio channel having an associated spreading code), said method

comprising the steps of: a) transmitting signals over additional radio channels between

the first radio station (1) or the second radio station (2) and other radio stations (3)

(Figure 1, Column 5 lines 5 – 7); b) widening data transmitted with said signals of

different radio stations with different codes (Column 11 lines 45 – 47, the PN codes are

mixed with the data, said mixed signal modulates the carrier such that the resulting

transmitted signal is a spread spectrum signal); and c) performing said pre-equalization

in said modulator (4) of said first radio station according to all of said different codes and

according to transmission properties of all of said radio channels (Column 12 lines 13 –

17).

Regarding Claim 23, Antonio teaches all of the claimed limitations recited in

Claim 22. Antonio further teaches wherein said resulting pre-equalized signals are

propagated from plural antennas (50,55) of the first radio station (1) and transmitted

over said radio channels (20,25) to the second radio station (2) (Figure 1, Figure 5), an

estimate of an impulse response of each of said radio channels (20,25) is ascertained in

the first radio station (1) and said pre-equalization of said signals propagated from said

plural antennas (50,55) is performed according to said estimate of said impulse

response (Column 12 lines 13 – 17).

Regarding Claim 29, Antonio teaches a radio station (1) comprising at least two

antennas (50,55) from which pre-equalized signals are propagated over respective

radio channels (20,25) to an additional radio station (2) (Figure 1, Figure 5, Column 5

lines 5 – 7, Column 12 lines 13 – 17, since this is a CDMA system there will be multiple

radio channels); a code generator (5) for widening data transmitted with the pre-

equalized signals with a respective code, said code generator ascertaining said respective code according to a selected radio link (Column 11 lines 45 – 51); and a modulator (4) including means for pre-equalization of radio signals to be transmitted to form the pre-equalized signals (Figure 5, Figure 6, Column 12 lines 13 – 17, the modulator (114) comprises an IIR filter for pre-equalization); wherein said means for pre-equalization of said radio signals to be transmitted from said at least two antennas (50, 55) performs said pre-equalization according to all actually used codes and transmission properties of all actually used ones of said radio channels (20,25) (Column 12 lines 13 – 17, since this is CDMA system this is an inherent characteristic).

Regarding Claim 30, Antonio teaches all of the claimed limitations recited in Claim 29. Antonio further teaches at least one channel estimator (11,12) and wherein said at least one channel estimator comprising means for determining an estimate of an impulse response of each of said radio channels (20,25) and said pre-equalization of said radio signals to be transmitted from said at least two antennas occurs according to said estimate for each of said radio channels (Figure 5, Column 5 lines 5 – 7, Column 12 lines 13 – 17, since the IIR estimates the channel impulse response there is an inherent channel estimator).

Claim Rejections - 35 USC § 103

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   Claims 14 – 15, 18, 20, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al. (US 6,519,456 B2) in view of Karlsson et al. (6,167,039).

Regarding Claim 14, Antonio teaches a method for transmitting signals between a first radio station (1) and a second radio station (2), in which a pre-equalization of radio signals to be transmitted is performed in a modulator (4) of said first radio station (Figure 1, Figure 5, Figure 6,Column 12 lines 13 – 17, the modulator (114) comprises an IIR filter for pre-equalization) and resulting pre-equalized signals are transmitted over a plurality of radio channels (20,25) from the first radio station (1) to the second radio station (2) (Figure 1, Column 5 lines 5 – 7, since this is a CDMA system there will inherently be a plurality of radio channels with each radio channel having an associated spreading code), said method comprising the steps of: a) receiving a respective pre-equalized signal propagated from said first radio station (1) over each of said radio channels (20,25) with an antenna of said second radio station (2) (Figure 1, Figure 5, Column 12 lines 13 – 17, since the signal will be pre-equalized at the base station the mobile station will receive a pre-equalized signal); b) determining an estimate of a total impulse response of all of said radio channels (20,25) in said first radio station (1) (Column 5 lines 5 – 7, Column 12 lines 13 – 17); and c) performing said pre-equalization of said signals propagated by said first radio station in said modulator (4) according to said estimate of said total impulse response determined in step b) (Figure 5, Column 12 lines 13 – 17).

Antonio does not teach a second radio station with a plurality of antennas.

Karlsson teaches a second radio station with a plurality of antennas (Column 5 lines 66 – 67).

Antonio and Karlsson both teach a CDMA system with mobile stations thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the plurality of antennas taught in Karlsson on the mobile station of Antonio for the purpose of suppressing the interference associated with signals transmitted from other base stations.

Regarding Claim 15, Antonio in view of Karlsson teaches all of the claimed limitations recited in Claim 14. Karlsson further teaches wherein received signals received by said antennas (60,65) of said second radio station (2) are combined linearly and subsequently input to a demodulator for demodulation (Figure 3, Column 6 lines 24 – 34, since this is a mobile phone used in a CDMA system there is an inherent demodulator).

Regarding Claim 18, Antonio in view of Karlsson teaches all of the claimed limitations recited in Claim 14. Antonio further teaches transmitting additional radio signals between said first radio station (1) or said second radio station (2) and additional radio stations (3), and wherein data transmitted with said signals from different radio stations are widened with different codes (Figure 1, Column 11 lines 45 – 47, the PN codes are mixed with the data, said mixed signal modulates the carrier such that the resulting transmitted signal is a spread spectrum signal) and said pre-equalization is performed in said modulator (4) of said first radio station (1) according to all of said

different codes and transmission properties of all of said radio channels (Column 12 lines 13 – 17).

Regarding Claim 20, Antonio teaches coefficients with which estimated impulse responses of said radio channels (20,25) are combined linearly in a transmitting radio station (1) to make an estimate of a total impulse response for pre-equalization of transmitted signals (Column 5 lines 5 – 7, Column 12 lines 13 – 17, since this is a CDMA system there will be multiple channels thus there will be a total impulse response of said channels).

Antonio does not teach a radio station (2) comprising at least two antennas (60,65) for receiving and transmitting radio signals transmitted over corresponding radio channels (20,25); means for multiplying respective received signals from said at least two antennas with corresponding coefficients (c1, c2) to form weighted received signals; means for adding said weighted received signals to form a resulting linear combination; means for selecting said corresponding coefficients (c1, c2) and means for inputting said resulting linear combination to a demodulator.

Karlsson teaches a radio station (2) comprising at least two antennas (60,65) for receiving and transmitting radio signals transmitted over corresponding radio channels (20,25) (Column 5 lines 45 – 48, Column 5 lines 66 – 67); means for multiplying respective received signals from said at least two antennas with corresponding coefficients (c1, c2) to form weighted received signals; means for adding said weighted received signals to form a resulting linear combination; means for selecting said corresponding coefficients (c1, c2) and means for inputting said resulting linear

combination to a demodulator (Figure 3, Column 6 lines 24 – 34, since this is a mobile

phone used in a CDMA system there is an inherent demodulator).

Antonio and Karlsson both teach a CDMA system with mobile stations thus it

would have been obvious to one of ordinary skill in the art at the time the invention was

made to use the plurality of antennas along with the weighting method taught in

Karlsson on the mobile station of Antonio for the purpose of suppressing the

interference associated with signals transmitted from other base stations.

Regarding Claim 25, Antonio teaches all of the claimed limitations recited in

Claim 23. Antonio further teaches wherein said resulting pre-equalized signals

propagated by the first radio station (1) are transmitted over said radio channels (20,25)

and received by a corresponding antenna of said second radio station (2) (Figure 1,

Figure 5, Column 5 lines 5 – 7, Column 12 lines 13 – 17, since this is a CDMA system

there is a plurality of radio channels), an estimate of a total impulse response of all of

said radio channels (20,25) is ascertained in said first radio station (1), said pre-

equalization of said signals propagated by said first radio station (1) is performed

according to said estimate of said total impulse response, and received signals received

by said corresponding antenna of said second radio station (Figure 1, Figure 5, Column

5 lines 5 – 7, Column 12 lines 13 – 17).

Antonio does not teach corresponding antennas (60,65) of said second radio

station (2) are combined linearly and subsequently input to a demodulator.

Karlsson teaches corresponding antennas (60,65) of said second radio station

(2) are combined linearly and subsequently input to a demodulator (Figure 3, Column 5

lines 66 – 67, Column 6 lines 24 – 34, since this is a mobile phone in a CDMA system there is an inherent demodulator).

Antonio and Karlsson both teach a CDMA system with mobile stations thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the plurality of antennas along with the linear combining taught in Karlsson on the mobile station of Antonio for the purpose of suppressing the interference associated with signals transmitted from other base stations.

7.   Claims 16 – 17, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al. (US 6,519,456 B2) in view of Karlsson et al. (6,167,039) and in further view of Zhuang et al. (Vehicular Technology Conference, 1995 IEEE 45th, Volume: 1, 25 – 28 July 1995 Pages: 206 – 210 Vol. 1).

Regarding Claim 16, Karlsson teaches all of the claimed limitations recited in Claim 15. Karlsson further teaches transmitting a signal from said antennas (60,65) of said second radio station (2) over each of said radio channels (20,25) to said first radio station (1) (Column 5 lines 45 – 48, since this is a CDMA system with base stations and mobile stations there will inherently by bi-directional radio links).

Antonio in view of Karlsson does not teach a reference signal and wherein said estimate of said total impulse response is derived from superimposed reference signals received in said first radio station.

Zhuang teaches a reference signal (Section II lines 5 – 9, the DFE needs a training or reference signal in order to generate the tap coefficients thus there is an

inherent reference signal) and wherein said estimate of said total impulse response is derived from superimposed reference signals received in said first radio station (Section II lines 3 – 5, since this is a TDMA system there will be multiple channels and thus there will be a reference signal associated with each said channel).

Antonio in view of Karlsson and Zhuang teach a multiple access wireless radio system that incorporates pre-equalization at the base station thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the reference signal method taught above in Zhuang in the wireless system of Antonio in view of Karlsson for the purpose of enabling proper channel estimation of the reverse link thus allowing the forward link signal to be properly pre-equalized.

Regarding Claim 17, Antonio in view of Karlsson and in further view of Zhuang teaches all of the claimed limitations recited in Claim 16. Zhuang further teaches wherein said respective reference signal is multiplied with a corresponding coefficient depending on which of said radio channels (20,25) is employed in transmitting said reference signal and said corresponding received reference signal is multiplied with said corresponding coefficient of said radio channel employed for transmitting said reference signal (Section II lines 5 – 9).

Regarding Claim 26, Antonio in view of Karlsson teaches all of the claimed limitations recited in Claim 25. Karlsson further teaches received by said corresponding antennas of second radio station (2) (Column 5 lines 66 – 67).

Antonio in view of Karlsson does not teach wherein respective reference signals are transmitted to the first radio station (1) over said radio channels (20,25) and said

estimate of said total impulse response is derived from superimposed reception of said reference signals in said first radio station (1).

Zhuang teaches teach wherein respective reference signals are transmitted to the first radio station (1) over said radio channels (20,25) and said estimate of said total impulse response is derived from superimposed reception of said reference signals in said first radio station (1) (Figure 1, Section II lines 3 – 9, the DFE needs a training or reference signal in order to generate the tap coefficients thus there is an inherent reference signal, since this is a TDMA system there will be multiple channels and thus there will be a reference signal associated with each said channel).

Antonio in view of Karlsson and Zhuang teach a multiple access wireless radio system that incorporates pre-equalization at the base station thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the reference signal method taught above in Zhuang in the wireless system of Antonio in view of Karlsson for the purpose of enabling proper channel estimation of the reverse link thus allowing the forward link signal to be properly pre-equalized.

Regarding Claim 27, Antonio in view of Karlsson and in further view of Zhaung teaches all of the claimed limitations recited in Claim 26. Zhuang further teaches wherein said respective reference signals are multiplied by corresponding coefficients according which of said radio channels is used for transmission of said reference signals (Section II lines 3 – 9), Karlsson further teaches wherein received signals received by said corresponding antennas (60,65) of said second radio station (2) are

multiplied by said corresponding coefficients and then linearly combined with each other

(Figure 3, Column 6 lines 24 – 34).

8.   Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio

et al. (US 6,519,456 B2) in view of Karlsson et al. (6,167,039) as applied to claim 18

above, and further in view of Zhuang et al. (Vehicular Technology Conference, 1995

IEEE 45th, Volume: 1, 25 – 28 July 1995 Pages: 206 – 210 Vol. 1).

Regarding Claim 19, Antonio teaches all of the claimed limitations recited in

Claim 18. Antonio in view of Karlsson does not teach wherein said transmission

properties of said radio channels are determined from transmitted data transmitted to

the first radio station (1) from the second radio station (2) and said additional radio

stations (3).

Zhuang teaches wherein said transmission properties of said radio channels are

determined from transmitted data transmitted to the first radio station (1) from the

second radio station (2) and said additional radio stations (3) (Figure 1, Section II lines 3

– 9, since this is a TDMA system there will be multiple channels and multiple radio

stations).

Antonio in view of Karlsson and Zhuang teach a multiple access wireless radio

system that incorporates pre-equalization at the base station thus it would have been

obvious to one of ordinary skill in the art at the time the invention was made to use the

properties of the radio channels taught above in Zhuang in the wireless system of

Antonio in view of Karlsson for the purpose of enabling proper channel estimation of the reverse link thus allowing the forward link signal to be properly pre-equalized.

9.   Claims 24 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al. (US 6,519,456 B2) in view of Zhuang et al. (Vehicular Technology Conference, 1995 IEEE 45th, Volume: 1, 25 – 28 July 1995 Pages: 206 – 210 Vol. 1).

Regarding Claim 24, Antonio teaches all of the claimed limitations recited in Claim 23. Antonio does not teach wherein a respective reference signal is transmitted to said first radio station (1) from a corresponding antenna (60) of said second radio station (2) over each of said radio channels (20,25) and said estimate of said impulse response of each of said radio channels (20,25) is derived from reception of said respective reference signal transmitted over each of said radio channels (20,25) to said first radio station.

Zhuang teaches wherein a respective reference signal is transmitted to said first radio station (1) from a corresponding antenna (60) of said second radio station (2) over each of said radio channels (20,25) (Figure 1, Section II lines 3 – 9, the DFE needs a training or reference signal in order to generate the tap coefficients thus there is an inherent reference signal, since this is a TDMA system there will be multiple channels) and said estimate of said impulse response of each of said radio channels (20,25) is derived from reception of said respective reference signal transmitted over each of said radio channels (20,25) to said first radio station (Figure 1, Section II lines 3 – 9).

Antonio and Zhuang teach a wireless multiple access radio system that incorporates pre-equalization at the base station thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the reference signal method taught above in Zhuang in the wireless system of Antonio for the purpose of enabling proper channel estimation of the reverse link thus allowing the forward link signal to be properly pre-equalized.

Regarding Claim 28, Antonio teaches all of the claimed limitations recited in Claim 22. Antonio does not teach wherein said transmission properties of said radio channels are ascertained from data transmissions of the second radio station (2) and the additional radio stations (2) to the first radio station.

Zhuang teaches wherein said transmission properties of said radio channels are ascertained from data transmissions of the second radio station (2) and the additional radio stations (2) to the first radio station (Figure 1, Section II lines 3 – 9, since this is a TDMA system there will be multiple channels and multiple radio stations).

Antonio and Zhuang teach a wireless multiple access radio system that incorporates pre-equalization at the base station thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the properties of the radio channels taught above in Zhuang in the wireless system of Antonio for the purpose of enabling proper channel estimation of the reverse link thus allowing the forward link signal to be properly pre-equalized.

Conclusion

10.   Any inquiry concerning this communication should be directed to Raymond S.
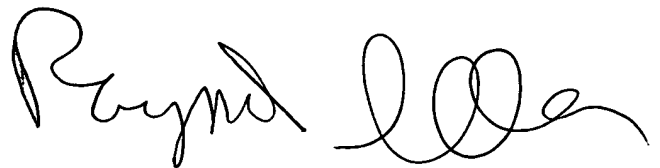
Dean at telephone number (703) 305-8998.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Nay Maung, can be reached at (703) 308-7745. Any response to this action

should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Or faxed to:

(703) 872-9314 (for Technology center 2600 only)

Hand –delivered responses should be brought to Crystal Park II, 2121 Crystal Drive,

Arlington, VA, Sixth Floor (Receptionist). Any inquiry of a general nature or relating to

the status of this application or proceeding should be directed to the Technology Center

2600 Customer Service Office whose telephone number is (703) 306-0377.

NAY MAUNG
SUPERVISORY PATENT EXAMINER